PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference NM5234	FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. PCT/IB 2002/003569	International filing date *(day/month/year)* 30.08.2002	Priority date *(day/month/year)*
International Patent Classification (IPC) or national classification and IPC H04B 7/005		
Applicant Nokia Corporation et al		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 3 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *(sent to the applicant and to the International Bureau)* a total of 5 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s))
      _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4. This report contains indications relating to the following items:
   - ☒ Box No. I Basis of the report
   - ☐ Box No. II Priority
   - ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - ☐ Box No. IV Lack of unity of invention
   - ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - ☐ Box No. VI Certain documents cited
   - ☐ Box No. VII Certain defects in the international application
   - ☐ Box No. VIII Certain observations on the international application

Date of submission of the demand	Date of completion of this report
02.06.2003	24.11.2004
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. +46 8 667 72 88	Authorized officer Åsa Rydenius /OGU Telephone No. +46 8 782 25 00

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/IB 2002/003569

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of:

- ☐ international search (under Rules 12.3 and 23.1(b))
- ☐ publication of the international application (under Rule 12.4)
- ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

☐ the international application as originally filed/furnished

☒ the description:

pages 1-15 as originally filed/furnished
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____

☒ the claims:

pages _____ as originally filed/furnished
pages* _____ as amended (together with any statement) under Article 19
pages* 1-5 received by this Authority on 20.04.2004
pages* _____ received by this Authority on _____

☒ the drawings:

pages 1-5 as originally filed/furnished
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing *(specify)*: _____
- ☐ any table(s) related to the sequence listing *(specify)*: _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing *(specify)*: _____
- ☐ any table(s) related to the sequence listing *(specify)*: _____

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/IB 2002/003569

Box No. V **Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-19	YES
	Claims		NO
Inventive step (IS)	Claims	1-19	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-19	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

Documents cited in the International Search Report:
D1: US2002/042283 A1
D2: EP1207644 A
D3: US2002/027897 A1

The cited documents represent the general state of the art. The invention defined in claims 1-19 is not disclosed by any of these documents.

The cited prior art does not give any indication that would lead a person skilled in the art to the claimed method and device for power control in a network during retransmission. Therefore, the claimed invention is not obvious to a person skilled in the art.

Accordingly, the invention defined in claims 1-19 is novel and is considered to involve an inventive step. The invention is industrially applicable.

Munich, 20 April 2004

Our Ref.: NM 5234-01WO OUN/mhu

Applicant: NOKIA CORPORATION
Serial Number: PCT/IB2002/003569

New Claims

1. A method for controlling power in a network transmitted from a first station to a second station, wherein said second station determines (S 202) a power target value (505) for a signal received from said first station and sends power control commands (506) to said first station depending on a deviation between said power target value (505) and a received power level (504),
said second station performing the steps of:
   - detecting (S 101) faulty data blocks (503) received from said first station,
   - requesting (S 102) retransmission of faulty data blocks (503) from said first station, and
   - adjusting (S 105) said power target value (505) to a temporary power target value (512) during said retransmission, wherein said temporary power target value (512) for retransmission is calculated (S 206) depending on the quality of said faulty data block (503) as the power target value (505) for first transmission (503)

of a data block minus (403) the quality weighted (402) by a predetermined power control step size (401).

2. A method according to claim 1, wherein said quality is estimated (S 103, S 205) as a performance metric, which indicates how much additional signal energy is required during retransmission in order to detect a faulty data block (503) correctly after receiving a retransmitted version (507) of said faulty data block (503).

3. A method according to claims 1 or 2, wherein said faulty data block (503) is combined with its retransmitted version (507).

4. A method according to any one of the proceeding claims, wherein said retransmitted version (507) is similar to the first version of said faulty data block (503).

5. A method according to any one of claims 1 to 3, wherein said retransmitted version (507) contains additional redundancy.

6. A method according to any one of the proceeding claims, wherein said temporary power target value (512) for retransmission is calculated (S 206) as a function of the current power target value (505) for first transmission (503) of a data block and the quality.

7. A method according to claim 6, wherein said temporary power target value (512) is calculated based on the following equation:

$$Eb/N0\_target\_retrans = Eb/N0\_target - quality * x\ dB$$

wherein Eb/N0_target_retrans is said temporary power target value (512) for retransmission (507), Eb/N0_target is said power target value (505) for first transmission of a data block (503), and x is a fixed power control step size (401) in dB.

8. A method according to any one of the proceeding claims, wherein said adjustment (S 105) of said power target value (505) is performed at the beginning (508) of a retransmission of a faulty data block (507).

9. A method according to any one of the proceeding claims, wherein a transition (510) back to the power target value (505) for first transmission of a data block (503) is performed before the beginning of the next data block (511), such that the received power level (504) is at the power target value (505) for first transmission when the next data block begins.

10. A method according to any one of the proceeding claims wherein a data block (503, 507, 509, 511) is divided into a number of slots (502) and wherein the number of slots (502) that said temporary power target value (512) is in use depends on said power control step size, the total number of slots (502) within a data block (503, 507, 509, 511), and the distance between said power target value (505) for first transmission and said temporary power target value (512).

11. A method according to any one of the proceeding claims, wherein said temporary power target value (512) is calculated depending on a delay before said temporary power target value (512) is met.

12. A method according to any one of the proceeding claims, wherein said power control commands (506) respectively comprise a bit indicating whether to increase or to decrease a transmission power level of said first station by said fixed power control step size.

13. A method according to any one of claims 1 to 11, wherein said power control commands respectively comprise a number of bits indicating whether to increase or to decrease said transmission power level as well as indicating a variable power control step size.

14. A method according to any one of claims 1 to 11, wherein said power control commands respectively comprise a number of bits indicating an explicit value for said transmission power level.

15. A method according to any one of the proceeding claims, wherein said step of detecting (S 101) faulty data blocks comprises a cyclic redundancy check (CRC).

16. A method according to any one of the proceeding claims, wherein said quality is estimated based on
    a) a bit or packet error rate of the received data stream,
    b) soft information obtained from a Viterbi decoder used for decoding convolutional codes, and/or
    c) the received signal-to-interference ratio.

17. A device for controlling power in a network transmitted from a first station to said second station, comprising:
    - means (607) for determining (S 202) a power target value (505) for a signal received from said first station,
    - means (608) for generating power control commands (506) for said first station depending on a deviation between said power target value (505) and a received power level (504),
    - means (604) for detecting (S 101) faulty data blocks (503) received from said first station,
    - means (605) for requesting (S 102) retransmission of faulty data blocks (503) from said first station,
    - means (606) for adjusting (S 105) said power target value (505) to a temporary power target value (512) during said retransmission, wherein said temporary power target value (512) being calculated (S 206) depending on the quality of said faulty data block (503), and
    - means (606) for calculating (S206) said temporary power target value (512) for retransmission as the power target value (505) for

first transmission (503) of a data block minus (403) the quality weighted (402) by a predetermined power control step size (401).

18. A device according to claim 17, wherein said second station is a base station and said first station is a mobile station used in a mobile network, in particular in an UMTS/WCDMA network.

19. A device according to claim 17 or 18, comprising means for carrying out a method according to any one of claims 1 to 16.